

In re Patent Application of:
OLSSON ET AL.
Serial No. 09/147,230
Filed: FEBRUARY 9, 1999

REMARKS

Applicants thank the Examiner for the careful and thorough examination of the present application, and for correctly withdrawing the previous prior art rejection in view of Applicants' arguments filed December 24, 2002. Claims 30-58 remain pending in the application. Favorable reconsideration of the rejections is respectfully requested.

Regarding the Examiner's concern with the parameter $(Y_{n,k})$, Applicants note that the argument function set forth in the specification is more accurately described as the ratio $(X_{n,k})/(Y_{n,k})$. As would be appreciated by those skilled in the art, the parameters may represent the received carrier and the desired carrier, respectively. Accordingly, the objection and rejections in view thereof, should be properly withdrawn. Furthermore, Applicants note that Claims 41 and 42 do not include the alleged indefiniteness and have not been rejected in view of any prior art.

I. The Invention

As shown in FIGS. 1 and 2, for example, the disclosed invention is directed to a receiver for use in an OFDM type transmission system, in which data is transmitted in frames. Each frame has a cyclic prefix that is a repetition of part of the frame. Control means are provided and the control means controls a sampling oscillator. Preferably, the control means include estimation means for estimating timing deviations of the sampling clock. The estimation means operates entirely on frequency domain input data.

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II. The Claims are Patentable

Claims 31-38, 44 and 46-53 were rejected as allegedly being indefinite for the reasons set forth on page 3 of the Office Action. Applicants direct the Examiner to pages 10 and 11 of the present specification which clearly describe the that the equalizer and the sampling control use well defined separate parts of the equalizer inverse channel model to achieve an output frequency domain signal with zero phase deviation relative to the transmitted signal.

Furthermore, Applicants point out that the Examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. §112, second paragraph should be whether the claim meets the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available.

As the Examiner is aware, the essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of: (A) The content of the particular application disclosure; (B) The teachings of the prior art; and (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. If the scope of the invention sought to be patented can be determined from the language of the claims with a reasonable degree of certainty, a rejection of the claims under 35 U.S.C. §112, second paragraph is not appropriate.

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Accordingly, Applicants believe that Claims 31-38, 44 and 46-53 meet the statutory requirements of 35 U.S.C. §112, second paragraph.

Claims 30-38, 43-53 and 58 were rejected in view of Isaksson et al. (U.S. 5,812,523) taken alone or in combination with Schmidl et al. for the reasons set forth on pages 4-7 of the Office Action. No prior art was applied against Claims 39-42 and 54-57. Applicants contend that Claims 30-58 clearly define over the cited references, and in view of the following remarks, favorable reconsideration of the rejections is requested.

Independent Claims 30 and 43 are directed to a OFDM system/receiver in which data is transmitted in frames, each frame having a cyclic prefix that is a repetition of part of the frame. The receiver includes a sampling oscillator, and a control means for controlling the sampling oscillator and for estimating timing deviations of the sampling oscillator. Also, the estimation means operates entirely on frequency domain input data. Independent Claims 45 and 58 includes similar features.

Independent Claims 31 and 44 include an adaptive equalizer having an equalizer inverse channel model, a separation circuit for separating the equalizer inverse channel model into a first and a second part, the first part being independent of sample timing and the second part being dependent on sample timing, and a controller for controlling the sampling oscillator in dependence on the second part. Independent Claim 46 includes similar features.

It is these combinations of features which are not

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fairly taught or suggested in the cited references and which patentably define over the cited references.

The Isaksson et al. patent, issued to the current Assignee of the present application, is directed to synchronization in an OFDM receiver. However, there is no disclosure or teaching of each frame having a cyclic prefix or the controller estimating timing deviations based entirely on frequency domain input data.

The Examiner asserts that the controller of Isaksson et al. (referred to by the Examiner as the "frequency control signal" in figure 1 of Isaksson et al.) controls the sampling oscillator (NCO) and inherently estimates timing deviations based entirely on frequency domain input data. Furthermore, the Examiner asserts that it would have been obvious to add a cyclic prefix to the frame of Isaksson et al. because Isaksson et al. teaches the use of a periodic derived absolute value of a signal.

Applicants point out that in relying upon a theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the reference. The Examiner has not provided any basis or technical reasoning to support this position. Indeed, column 5, lines 17-24 of Isaksson et al. set forth that the digital signal is applied to the synchronization block in the time domain.

The Examiner has relied upon the Schmidl et al. patent (U.S. 5,732,113) as disclosing a method and apparatus for attaining synchronization of a receiver to an OFDM signal,

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including estimating timing deviations of the sampling clock based entirely on frequency domain input data. More accurately, the Schmidl patent teaches that after determining an estimate for the entire carrier frequency offset, the receiver can be synchronized to eliminate this carrier frequency offset either by multiplying the error out from the samples or by re-adjusting one or more of the local oscillators in the receiver, and an estimate can be made for the sampling rate offset. However, the Examiner has again mischaracterized the cited patent as there is no teaching of estimating timing deviations of the sampling clock based entirely on frequency domain input data, as claimed.

Applicants maintain that the Examiner is impermissibly using the teachings of Applicants' own patent application as a roadmap to modify the prior art. For example, as noted above, the method and apparatus of Isaksson et al. does not include the use of a cyclic prefix or the estimation of timing deviations based entirely on frequency domain input data. Again, there is no disclosure or teaching of estimating timing deviations based entirely on frequency domain input data in Schmidl et al. either.

As the Examiner is aware, to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim features. The initial burden is on the Examiner to provide some

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suggestion of the desirability of doing what the Applicants have done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the reference must expressly or impliedly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the reference. Both the suggestion to make the claimed combination and the reasonable expectation of success must be founded in the prior art and not in Applicants' disclosure.

There is simply no teaching or suggestion in the cited reference to provide the combination of features as claimed. Accordingly, for at least the reasons given above, Applicants maintain that the cited references do not disclose or fairly suggest the invention as set forth in the independent claims. Furthermore, no proper modification of the teachings of these references could result in the invention as claimed. Thus, the rejections under 35 U.S.C. §103 should be withdrawn.

It is submitted that the independent claims are patentable over the prior art. In view of the patentability of the independent claims, it is submitted that their dependent claims, which recite yet further distinguishing features are also patentable over the cited references for at least the reasons set forth above. Accordingly, these dependent claims require no further discussion herein.

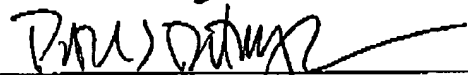
III. Conclusion

In view of the foregoing remarks, it is respectfully submitted that the present application is in condition for

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allowance. An early notice thereof is earnestly solicited. If, after reviewing this Response, there are any remaining informalities which need to be resolved before the application can be passed to issue, the Examiner is invited and respectfully requested to contact the undersigned by telephone to resolve such informalities.

Respectfully submitted,



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CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has been forwarded via facsimile number 703-872-9314 to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 this 2nd day of July, 2003.

